

Appl. No. 09/923,720  
Amdt. Dated January 13, 2004  
Reply to Office Action of October 14, 2003

REMARKS

Reconsideration of the application is requested.

Claims 1, 2, 4-27 are in the application. Claims 1, 2, 4-16, and 27 are subject to examination and claims 17-26 have been withdrawn from examination. Claim 1 has been amended. *Claim 3 was previously canceled to facilitate prosecution of the instant application.*

Applicant acknowledges the Examiner's approval of applicant's proposed drawing corrections filed July 31, 2003. However, in item 1 on page 2 of the above-identified final Office Action, the Examiner objected to the drawings because the drawings must show every feature of the invention specified in the claims. More specifically, the Examiner explained that the feature "a first set of global actuators to compensate for global tilting of the wafer or the chuck" must be shown. The Examiner's suggested correction has been made through the addition of Fig. 10.

No new matter is believed to have been added, as supporting disclosure for new Fig. 10 may be found in Fig. 8 (dedicated actuators) and Figs. 4-8 (global actuators). Moreover, the claimed devices that use combinations of large actuators and small actuators are also disclosed in the specification

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(e.g., see page 12, line 21 to page 13, line 2). The specification has also been amended to include specific references to Fig. 10, but the additions are virtually identical to the aforementioned disclosure in the specification in the paragraph bridging pages 12 and 13.

In item 2 on page 2 of the above-identified final Office Action, claims 1-2 and 4-16 have been rejected as being obvious over U.S. Patent No. 5,825,192 to Hagihara (hereinafter '192) in view of U.S. Patent No. 5,172,053 to Itoyama (hereinafter '053) under 35 U.S.C. § 103(a).

In item 6 on page 4 of the above-identified final Office Action, claim 27 has been rejected as being obvious over '192 in view of '053 and further in view of U.S. Patent No. 6,297,656 to Kobayashi, et al. (hereinafter '656) under 35 U.S.C. § 103(a).

The rejection has been noted and the claims have been amended in an effort to even more clearly define the invention of the instant application. Support for the changes is found on page 13, lines 6-8 and page 24, lines 19-20 of the specification of the instant application.

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Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful. An important function of the present invention is that the test surface profile is aligned **as a function of an electrical signal** in parallel with the wafer surface **PRIOR** to the test surface profile contacting the wafer surface profile. More specifically, claim 1 calls for, *inter alia*, a test apparatus. The test apparatus includes:

- a chuck for holding a wafer with a group of contact areas that define a wafer surface profile;

- a probe card on a test head that has contact areas that define a test surface profile; and

- at least three actuators **electrically driven to change length according to an electrical signal**, said at least three actuators being configured on said probe card for **aligning** the test surface profile **parallel** with the wafer surface profile **prior to the test surface profile contacting the wafer surface profile**, said actuators also changing a distance between said performance board and said contacts of said probe card in a direction substantially orthogonal to the wafer surface profile.

The active actuators, such as piezoelectric elements (page 13, lines 6 to 8 and page 24, lines 19 and 20), are provided to align the test surface parallel to the wafer surface prior to contact. Other exemplary electrically based actuators include electrical motors or pumps (page 13, lines 20 to 22).

The '192 reference discloses a probe card device for testing the electrical characteristics of a wafer by bringing bump

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electrodes on a test surface into contact with the wafer surface through a mechanical or passive pushing mechanism.

The blocks 39a of '192 are part of the pushing member 39 that helps create the pushing region 33a of the probe card 32.

The pushing region 33a of '192 is used to press the probe card against the wafer surface, but the pushing region 33a is not aligned with the wafer surface prior to contact, rather the "bump electrodes 37" are "substantially aligned in a horizontal plane" (e.g., see col. 8, line 40 and col. 7, line 33). Moreover, the fact that the alignment of the small vertical differences between the probe card and the wafer surface is only completed **AFTER** contact is further illustrated in col. 7, lines 27-33 where '192 states:

The elastomer layer 62 is substantially equal in size to the pushing region 33a and serves to absorb small differences in vertical length among the bump electrodes 37 when the bump electrodes 37 **are brought into contact** with the electrode pads 12a, with the result that the tips of the bump electrodes are positioned substantially in a horizontal plane.

Contrary to the Examiner's assertion on page 3, line 10, '192 does NOT align the test surface parallel with the wafer surface **PRIOR** to contacting the wafer surface profile.

Preliminary mechanical adjustments may occur such that "bump electrodes 37" are "substantially aligned in a horizontal plane", but this adjustment is not "electrical" alignment of

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"the test surface profile parallel with the wafer surface profile" as recited in claim 1 of the instant application. As explained in the specification, the wafer surface profile may not be "substantially aligned in a horizontal plane" resulting in a misalignment of the wafer surface and test surface, because the test surface is "substantially aligned in a horizontal plane" according to '192. This misalignment can result in damage to the wafer surface, because the bump electrodes 37 may only be aligned while the test surface is in contact with the wafer surface.

In fact, '192 teaches away from prior electrical alignment of the test surface with the wafer surface as recited in claim 1 of the present invention. '192 teaches that the test surface is mechanically aligned by use of at least one passive "coil spring 45" to impart an elastic force onto various blocks 39a. The elastic force allows the blocks 39a to elastically adapt to the wafer surface **once contact has been made**. As such, the length of the passive actuators or "blocks 39a" is changed only after the test surface makes contact with the wafer surface (see Fig. 4). Thus the actuators are mechanically driven by the pushing force of contact, not in response to an electrical signal.

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Clearly, '192 does not show "aligning the test surface profile parallel with the wafer surface profile prior to the test surface profile contacting the wafer surface profile" as recited in claim 1 of the instant application.

In addition, the Examiner's earlier comments that '192 teaches "actuators (pushing mechanism 38)" must be limited to the allegedly electromechanical elements (e.g., see the last paragraph on page 5 of the Office Action dated March 31, 2003). The disclosure provided in '192 does not preempt the piezoelectrical elements disclosed in the instant application and their ability to be actively driven by electrical signals. More specifically, '192 only shows mechanical and passive actuators 39a.

Clearly, '192 does not show "at least three actuators electrically driven ... according to an electrical signal" as recited in claim 1 of the instant application.

The remaining secondary references, '053 and '656, do not contain sufficient disclosure regarding electrical alignment before contact to compensate for the inadequacy of '192 with regard to the clear lack of electrical alignment of the test surface profile in parallel with the wafer surface profile.

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It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claim 1. Claim 1 is, therefore, believed to be patentable over the art. The dependent claims are believed to be patentable as well because they all are ultimately dependent on claim 1.

In view of the foregoing, reconsideration and allowance of claims 1, 2, 4-16, and 27 are solicited.

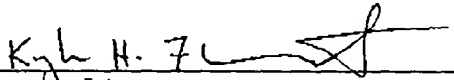
In the event the Examiner should still find any of the remaining claims to be unpatentable, counsel would appreciate receiving a telephone call so that, if possible, patentable language can be worked out. In the alternative, the entry of the amendment is requested, as it is believed to place the application in better condition for appeal, without requiring extension of the field of search.

If an extension of time is required, petition for extension is herewith made. Any extension fee associated therewith should be charged to the Deposit Account of Lerner and Greenberg, P.A., No. 12-1099.

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Please charge any other fees that might be due with respect  
to Sections 1.16 and 1.17 to the Deposit Account of Lerner  
and Greenberg, P.A., No. 12-1099.

Respectfully submitted,

  
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KHF:cgm

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